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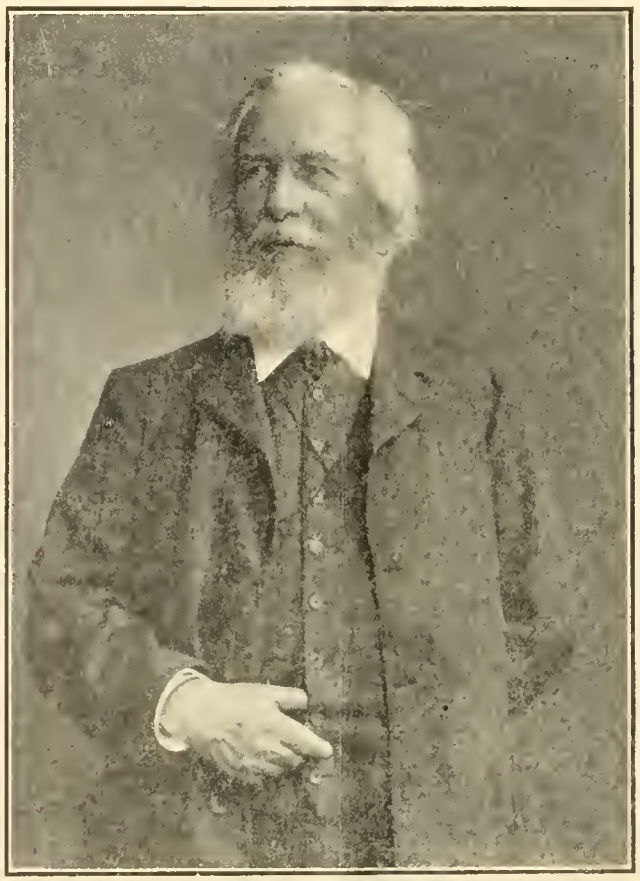
FIND MAN IN THIS PICTURE

ANSWER ON PAGE THREE

Ernst Haeckel and the Ontogenetic Law

By Alexander Goldenweiser

If Darwin was the father of evolution, Huxley was its war horse, but Haeckel, the great German Darwinian, was its knight in shining armor. Haeckel's greatest contribution to evolutionary theory was probably his "fundamental ontogenetic law" which stated that ontogeny recapitulates phylogeny. This meant that every organism in its pre-natal embryonic development recapitulates the stages through which the species of organism had passed in their phylogenetic succession.



Ernst Haeckel

Haeckel's work on this subject was built on the foundation laid down by Karl Ernst von Baer, an Esthonian, who in his "Development of Animals" (published about 1828) first made known the facts upon which his own and later Haeckel's theory were based. Baer taught that the many specialized parts of the adult organism, such as the nervous system, the alimentary canal and the body wall, developed from embryonic leaf-like layers, four in number (by later investigation reduced to three), which were identical in all the higher animals. Baer also determined the chief stages of embryonic development, to wit: first the fertilized egg and its differentiation, then the germ-layers, and last the specialized tissues and organs. This sweeping generalization was fully borne out by later investigations.

While the details of Baer's theory were greatly modified in the course of the intensive biological researches of the middle nineteenth century, its basic kernel withstood the test of time. In his "General Morphology" (1866), Haeckel was able to set down the features of the ontogenetic law in forty-four theses of which the most important were the following: 1. The development of organisms is a physiological process, depending on mechanical causes, or physico-chemical movements; 2. Ontogenesis, or the development of the organic individual, is directly determined by phylogenesis, or the evolution of the organic stem (*phylon*) to which it belongs; 3. Ontogenesis is a brief and rapid recapitulation of phylogenesis, determined by the physiological functions of heredity and adaptation.

Of these three theses, the second and third are accepted in all modern evolutionary biology, whereas the first has led to much discussion and controversy since the emergence of the vitalists (such as the Berlin embryologist, Oscar Hertwig, Hans Driesch the biologist, the philosopher Bergson and many others) who claim that the phenomena of life cannot be wholly explained by physico-chemical laws but require the postulation of a specific *vital* principle.

Haeckel, who was attacked on all sides — by scientists and theologians alike — spent much time and effort in elaborating and substantiating the second and third theses of his theory. In his "Studies of the Gastrea Theory" (1872-1877) he showed that in all tissue-animals, from the lowest sponges and polyps to the highest articulata and vertebrata, the multicellular organism developed from the same primitive embryonic form (the *gastrula*), and that this was the ontogenetic repetition, in virtue of heredity, of a corresponding stem-form (the *gastrea*). But Haeckel went further and in his "Anthropogeny" (1874) he illustrated the recapitulation theory on the human organism. In this work he attempted to explain the complex process of individual development, for the whole frame and every part of it, by causal connection with the stem-history of the animal ancestry of man. In the last edition of his book Haeckel demonstrated this theory with thirty plates, five hundred engravings and sixty genetic tables.

In answering his numerous critics, Haeckel also tried to make clear that the ontogenetic process must not be conceived as an exact duplication of the phylogenetic one, but that the former was an abbreviated recapitulation of the latter, complicated by condensation, disturbance or falsification. The biogenetic law, when properly understood, thus comprises two factors, one positive, one negative. The positive factor—*palingenesis*—reproduced a part of the original history of the stem;

the negative factor—*cenogenesis*—disturbs or alters this picture in consequence of subsequent modification of the original course of development.

The ontogenetic law, in this amplified version, has become a common-place of evolutionary thought. When in the latter nineteenth century the social sciences fell under the spell of evolutionary ideas, much obfuscation and error resulted from an uncritical application of the law in the social field. It was argued, for example, that the psychic development of a modern individual recapitulates the psychic history of man from savagery upward and that savages thus become comparable to our children. A very silly notion this, for what is left out of account here is the nature of the historic process which is one of cumulation and accretion. Savage cultures are as historic and as old as our own and savages have children who—rather than their fathers—are quite like our children. An organic law of growth cannot be expected to apply to historic series which are based on the transfer and cumulation of tradition.

Let Man Do It!

By George Dorsey

TODAY no sea or land is safe from Man. Even at the dawn of history there were cities and civilization. Beyond that dawn—what of sea or land? Or of Man?

Sweep the ships from the sea. Clear the earth of human homes and cultivated fields, and restore the trackless forests. Turn the horses, cows, sheep, chickens, cats and dogs back to nature. Strip man of the last shred of his handiwork. Leave him nothing—no bow and arrow or spear, nor stone knife to cut a stick with or open a mussel shell; no light nor hearth, nor knowledge of making fire: no basket, pot, bucket or cup to carry water in; no mat to lie on, nor skin of beast to cover his body; no man-made thing at all, nor anything ready-made to do anything with; nor a friend in the world outside his own kin. Such was the untamed, unnamed world *our ancestors faced with* only their naked bodies.

Take a look at that body. It is ours—we need not be ashamed of it; if it grins we can smile back—and marvel that it did its work so well. It is work that counts—the work that man has done is the marvel; man's body is nothing much to look at.

Man could run, swim, jump, climb, dig—but not so well as deer, fish, flea, squirrel, mole; he could not fly at all. What could he oppose to wings of eagles, strength of elephants, teeth of tigers, fleetness of deer, venom of vipers, agility of monkeys? Mind? Mind alone is nothing. Intelligence? Intelligence alone feeds nobody, subdues nothing. There must be structure back of mind, mechanism for intelligence to work with; that was his physical body.

When man shot an arrow from a bow, he showed "human" intelligence. But he could not make arrow without that man-body; arms free to use the finest tools ever conceived, human hands; a brain full of cells to store up experience; a larynx fit to relate experiences, and ears attuned to hear the experiences of others.

With spear and arrow, Man suddenly had arms longer than the tentacles of a devil-fish. He need not run like a deer or dive like a whale—spear and arrow ran and dived for him! By a mere puff through a hollow tube, he sent a poisoned dart over the tallest tree. It made less noise than the wing of bee but could overtake and kill the swiftest bird; it was a fang as deadly as the viper's, a dagger longer than the sabre-toothed tiger's.

It had taken nature millions of years to invent poison fang, dagger tooth, elephant strength, and eagle wing. Having made man, nature said: Let man do it—let him run the world a while and worry and invent things!

Man accepted the challenge, and turned the job over to his wife; leaving her to care for the babies and the fire. He went a-fishing. There he met some cronies and organized the explorers club.

The world's work was begun.

Let man do it! Man was not new: he was different, he was superior, he had the equipment to do human things. He could hoe his own row, and row his own boat. And he had to. He was no little Tommy Tucker—to sing for his supper. He was still animal, and, like the animals, he had to root, hog, or die. Having no snout, he made a digging stick. But we, brave little Jackie Horners that we are, cry: What a great boy am I! We did not make the Christmas pie, we found the banquet set.

To set that banquet, every sea was sailed and every land explored—even before the dawn of recorded history. Beyond that dawn was man—insignificant in our eyes, and unsung; crude, rude. But he was man—he could ponder, he could worry. Without worry there would have been no progress; worry means a problem unsolved. He solved problems by inventing things. And nature let him.

TO FIND MAN IN THE PICTURE

Have you decided which one of the little figures on the front cover resembles you the most? They are the embryos of nine mammals at the stage when they have fish like tails and gill slits. Which one is the human embryo?

Do not be surprised that the question puzzles you. They are almost like peas in a pod. The embryonic development of man and other mammals goes through such closely similar ancestral stages that even scientific experts can hardly tell them apart.

These figures were taken from a brochure by Ernst Haeckel, "Unsere Ahnenreihe" (Our Ancestry), published in 1908. Haeckel explains that some of them were taken from his own collection, and some from various other scientific sources and that such soft and delicate objects suffer changes through the various methods of preservation and therefore do not correspond exactly. If all nine had been obtained at exactly the same stage of embryonic development and kept under exactly the same conditions, the outer similarity would be still more striking. The inner structures of all these embryonic bodies are almost exactly alike. According to the Biogenetic law, they bear indisputable witness to the "Monophyletic Origin of all Mammals" from a common root, a Pro-mammal of the Triassic Period.

So, after all, we will have to tell you which is which. The nine embryos are:— 1. Spiny ant-eater; 2. Opossum; 3. Hog; 4. Cat; 5. Bat; 6. Lemur; 7. Monkey; 8. Gibbon (Ape); and 9. Man.

The Origin of Mammals

By Maynard Shipley

As is well known, animals below mammals in the evolutionary scale are hatched from eggs in such a condition that they are ready at once to pick up bits of food and thus nourish themselves from the very start. Mammals, on the contrary, must be nourished (suckled) by the mother, even when hatched from eggs laid in a nest, as in the case of the Australian Duck-billed Mole.

We need not here enumerate the twenty-seven characters which distinguish mammals from all other classes of animals, important as these are to the student of zoology. For the average layman, the important point is that mammals are nourished by means of *mammae* (breasts), with or without teats, and are, at one stage or another of their lives, provided with hair, though these may later be lost, or more or less obscured. Just as feathers are an indubitable mark of a bird, so hair is an invariable attribute of a mammal. In fœtal life, even the glossy-skinned whales are covered with hair, as are human beings; and the baby elephant is born with a covering of hair. The adult whale retains only a few bristle-like hairs on the upper lip.

Neither the Amphibia nor the Reptilia possess either hairs or feathers, nor glands for secreting milk for their young. Mammals alone possess sweat glands and oil glands, some being locally specialized, others generalized and scattered over the skin. Reptiles and birds have a dry skin, whereas the Batrachians (Amphibia) have a skin rich in sensitive organs and glands of all sorts. Reptiles and amphibians are cold-blooded, their body temperature changing with the external temperature, usually one or two degrees above the surroundings. Nearly all mammals (and birds) preserve a constant temperature, considerably higher than that of their usual surroundings. The body temperature of mammals is capable of varying with safety to the extent of only a few degrees.

Mammals Derived From Reptiles

Notwithstanding these and other numerous features in which mammals differ from amphibians and reptiles, if the theory of evolution is valid, the Mammalia must have evolved from either the Amphibia or the Reptilia.

Years ago Huxley came to the conclusion that the Mammalia were derived from the Amphibia, and this theory was widely accepted. It was believed until quite recently that certain characters in modern amphibia are primitive, and were the same in the early reptiles. This is now known to be a fallacy, thanks to the indefatigable labors of modern palaeontologists. Fossil reptiles found in the Triassic rocks of South Africa show quite clearly that the earliest mammals were derived from some generalized branch of the Reptilia, close to the cynodonts (dog-toothed reptiles). Even in the Permian (just preceding the Age of Reptiles), reptiles with mammal-like features in their skeletons had already appeared. In most reptiles the teeth in the front and back portions of the mouth are much alike. In the mammal-like reptiles of the Karoo series of strata in South Africa, the teeth are no longer uniform, but are developed into incisors, a canine or "dog-tooth," and a series of premolar and molar teeth behind. It is quite possible that some of these mammal-like reptiles were developing toward a more or less warm-blooded phase, through a change which produced the four-chambered heart and complete separation of the arterial and venous circulation.

The Monotremata are mammals that lay large reptile-like eggs with a firm leathery shell. While they lay eggs, they are nevertheless mammals, since they nurse their young, somewhat in the manner of the higher mammals, but with an important difference.

Milk for Babies

When the young of these queer creatures are hatched, they are nourished by the mother from primitive abdominal milk glands, the milk percolating through a sieve-like place in the skin, buried deep in the hair. The young simply lick off the drops of milk as they drip from the hair. These primitive mammary glands are only modified sweat glands, formed in the skin. Here we meet with a good illustration of the principle that any organ found in a higher animal is invariably derived from a pre-existing organ in a lower form of life. No magic is required—only evolution.

There are two families of these egg-laying mammals, both of which agree in possessing certain marked reptilian characters. When the first specimen was exhibited in England, it was at once declared to be a fake, on a par with the manufactured or composite mermaids at that time shown everywhere. One is not surprised to hear of this skepticism. Even seeing is not necessarily believing when one stands before a "furry quadruped with the bill and feet of a duck", an animal with a coat of soft brown fur, that lays eggs, yet gives milk to its young! But such is the miscalled "duck-billed mole" of Southern Australia.

The other family, represented by Echidna and Proechidna (the latter an inhabitant of New Guinea), is known as the "Australian ant-eater," or "spiny ant-eater." The most common species has a heavy protective covering of stiff quill-like spines like a porcupine, with an underlying layer of coarse hair. It has a long snout, no teeth, and a rudimentary tail, much like that of a bird. And it lays eggs like a bird, but only one at a time. It undergoes a short incubation in a marsupial-like brood pouch. The very immature young *Echidna* lies quietly in the pouch for some time, just able to lick up the milky secretion that exudes from the walls of the pouch, saturating the hairs licked by the young ant-eater.

The aquatic duck-bill, on the other hand, has no pouch. It lays two or three eggs in a nest made of grasses, similar to a simple bird's nest, the eggs being kept warm by the body heat of the mother.

Whereas the young of the spiny ant-eater has no teeth when born, the young "Duck-bill platypus" has a set of milk teeth, *all molars*. These drop out and are replaced by broad horny plates developed from hardening of the gums which line the inside of the bill.

We have, in these survivors of the Age of Reptiles, not the ancestors of modern mammals, but highly modified descendants of a primitive type of pro-mammal, lower in the evolutionary scale than the marsupials, or pouched mammals, most of which are also peculiar to Australia—a continent cut off from the rest of the world some time during the Age of Reptiles. Perhaps the Fundamentalists can explain to their satisfaction just how the montremes and marsupials reached Australia from Mt. Ararat, 5000 years ago!

Fossil remains of very primitive mammals are found in the strata overlying those in which the cynodonts were found. The former were all small animals, the size of a rat, or smaller. Some of these early mammals were of very generalized types, capable therefore of giving rise to the varied forms met with at the beginning of the Tertiary Era, Age of Mammals.

We now meet, for the first time, with fossil forms somewhat similar to some of our modern lemurs, or half-apes. In later strata true apes appear, followed still later by the fossil remains of the higher anthropoids, or man-like apes. Finally ape-like men appear, along with crude implements of industry and the chase.

Thus we may trace our own family back to the very beginning of the Mammalia, the class to which we belong—and even to the Reptilia, our remote ancestors.

Proposal to Cross Man and Ape

By Howell S. England

Elie Ivanoff

FOR the past eighteen years I have tried to interest some American scientist in the possibility of producing primitive man by hybridizing the several anthropoids with the different races of man. Realizing that the anthropoids could not remain in good health anywhere in the United States it was my idea that a plant for carrying on experiments should be established somewhere in Africa or the East Indies.

The only encouragement that I received from any American scientist was from Dr. Oscar Riddle, of the Carnegie School of Experimental Evolution, but this school, under the terms of its foundation, could not establish any plant for any purpose outside the United States. Within the last year I have also gained the active co-operation of Dr. A. L. Herrera of Mexico.

Albert Calmette

In September, 1924, I learned that the French Government had made a grant to the Pasteur Institute of several thousand acres of land at Kindia, in French West Africa, and had built a laboratory for experimenting with gorillas and chimpanzees by innoculating them with various human diseases for the purpose of preparing serums for their cure.

Dr. Calmette describes the climate of Kindia, the natural home of chimpanzees and gorillas, as being healthy for orang utangs and gibbons and also suitable for the residence of white scientists.

I therefore asked Dr. Calmette whether his plant at Kindia could be used for the experiments that I had in mind. He acknowledged the great importance of my proposed experiments, and said that his plant at Kindia would be open to the scientists of the world for this purpose and that he had instructed Mr. Wilbert, who is in charge of the work at Kindia, to co-operate in every way. He said, however, that before beginning the experiments it would be necessary to have a foundation of approximately 500,000 francs, roughly $100.000.00.

Dr. Calmette introduced me to Dr. Elie Ivanoff of Moscow, a biologist deeply skilled in artificial fecundation, who also had in mind the producing of primitive man by hybridizing the various anthropoids, and who was willing to go to Kindia and begin the work as soon as possible.

Howell S. England

Since then I have tried, so far without success, to obtain the necessary foundation of $100,000 for Dr. Calmette. The work has now begun of raising the required amount of money by popular subscription. Mr. Freeman Hopwood of Box 483, City Hall Station, New York City, has kindly consented to act as treasurer for the fund. It is my suggestion that we name the foundation "The Edward D. Cope Foundation of Experimental Anthropology", thus making it a memorial to the late Professor Cope, whose original work in Palaeontological research did so much to establish the doctrine of biological evolution.

How Old Is the World?

By Allan Strong Broms

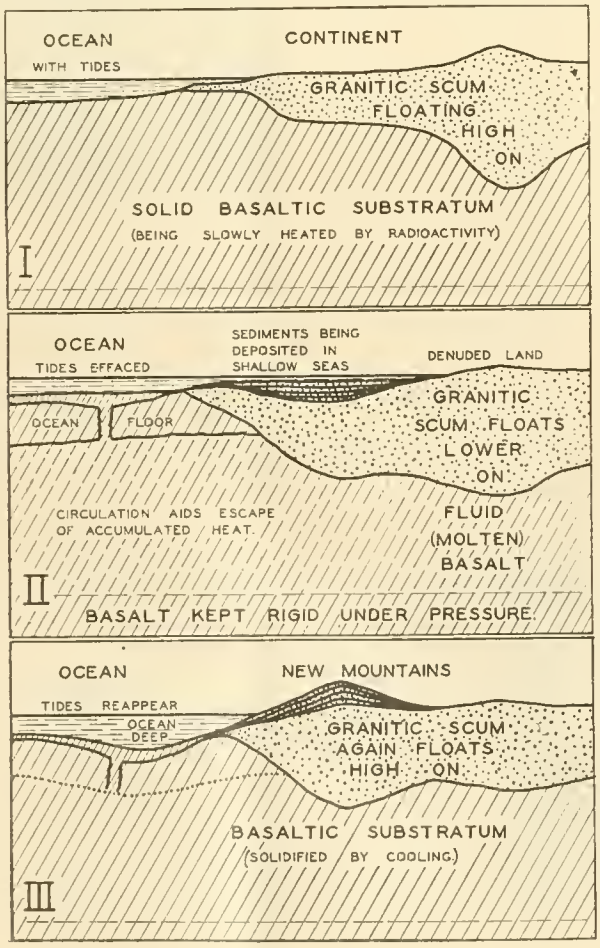
THE existence of ocean tides tells us one important thing about the earth's interior,—it is rigidly solid. Were it fluid (even a thin layer under the cool outer crust) there would be tides in that fluid and the thin crust would heave and fall upon it in time with the waters of the ocean. The crustal tides would thus efface the ocean tides. As this does not occur, we know that at present the earth's interior is rigid as a solid.

But though the interior rocks yield but slightly as tides, they are not unyielding under great pressures. Under the enormous weights of the overlying rocks, they flow slowly and thickly, yielding most where the pressure is heaviest. On this viscous interior the surface rocks *float*. Where they are heavy, they sink deep and produce the beds of the oceans. Where they are light, they float high, producing our land areas.

Heavy Substratum

We are very sure that the heavy rocks of the ocean beds and those deeply underlying the continents are largely *basaltic*. Outflows of volcanic lavas indicate this. The lighter continental rocks, which float like a scum on the heavier substratum, are largely *granitic*.

It happens that the basalts melt at a lower temperature than the granitic rocks. This means that as the interior heat of the earth accumulates (due, as we discovered in the last article, to the heat-emitting radioactive elements thorium and uranium distributed through the rocks), the basalts will eventually melt into a fluid layer under the still solid, unmelted crustal rocks.



As the basalts melt, they expand, with two important results. On the one hand, the expansion slightly increases the earth's diameter and circumference. To expand, the crust cracks. Into the cracks then flow the molten lavas from below. They soon cool and harden, and thus effectually prevent any later reduction of the crustal surface to fit a shrinkage of the interior.

On the other hand, the expansion of melting means a reduction in density of the basaltic substratum. This reduces its power to support the overlying continents, which thereupon sink deeper. As the continents sink, their lowlands are invaded by shallow arms of the sea. Within these transgressional seas are then deposited layers of sediments washed in by streams from the neighboring lands. Layer upon layer is laid down, adding to the weight and forcing the continental masses locally deeper into the underlying subtstratum.

A Period of Rapid Cooling

But when the substratum rocks become liquid, they flow. Twice a day they rise and fall in great tides,—and of course, the crust and oceans with them. More important, the deeper and hotter lavas rise, displaced by the cooler (and heavier) upper lavas which sink. A vertical circulation thus sets in, its effect being to carry heat rapidly towards the surface. These rising, hot lavas also attack and melt the bottom of the solid crust, particularly the basaltic ocean beds, reducing their thickness and therefore their power to keep the interior heat from escaping into outer space. The heat from radioactivity, which, according to Professor Joly, has been accumulating for perhaps thirty or forty million years, now rapidly escapes through the ocean beds in some six to twelve million years.

But the interior heat cannot thus escape through the thick, unmelted continents. It must go right on accumulating without relief, to what end we can hardly say. But fortunately, the tidal pull of the moon must cause a slow westward drift of the protuberant land masses. In due time, every part of the overheated substratum is uncovered and given its chance to cool off.

Mountain Building

As the substratum cools and hardens, it shrinks. The substratum tides disappear and the ocean tides reappear. The earth crust, enlarged to fit the expanded substratum, now wrinkles into great folds as it settles down upon the shrinking interior,—downward folds making valleys and ocean-deeps, upward folds making mountain ranges, both kinds being great, unstable, pressing arches that break and fault and crush. Ranges bearing north and south, such as those of the Americas, doubtless relieved the east and west pressures, while others bearing east

and west, notably in southern Eurasia, reduced the north and south circumference and pressures.

Also, in solidifying, the substratum becomes denser. Upon this denser support, the continental scum again floats high. As the continents rise relative to the ocean levels, the shallow, transgressional seas retire from the lowlands. The continental masses underlying these seas, hitherto forced deep into the substratum by the increasing weight of the accumulating sediments, are now slowly uplifted by the denser substratum. Just where the water-laid strata are thickest, there will be upheaved the greatest mountain ranges. So we find sea beds and their fossils on the highest of mountains. With our modern knowledge of geology, we can understand this without straining piously over any absurd flood story.

A Series of Geological Cycles

We have clear evidences, gathered by the patient and exacting labors of the geologists, that five or six of these great cycles have occurred in the decipherable history of the earth. We are ourselves at the beginning of a period of slow heat accumulation which must in the remote future, as in the past, culminate in another geologic revolution of crustal tides and heat escape, of transgressional seas and birth of mountain ranges. The whole story canot be told in these brief sketches, but the main events, with the related story of organic evolution, will be outlined in the next article. For the details and supporting evidence, the reader is referred to John Joly's "The Surface History of the Earth."

Proofs of Evolution from Geology and Palaeontology

By Hugh F. Munro

GEOLOGISTS have classified about two hundred and fifty thousand feet of rocks as comprising the known thickness of the earth's crust, although its actual thickness is much more, the lowest or Pre-Cambrian layer being of unknown extent. Heat and pressure have profoundly modified the Archaean rocks, as evidenced by their structure; and no (or at least very doubtful) indications of life are found. Such rocks as granite and basalt have undoubtedly been formed directly by the cooling of molten matter and naturally furnish no trace of organic remains. Next come the great Huronian series, a thick group of sedimentary rocks containing considerable indirect evidence of life (e.g., limestones) and some problematical fossils. Then comes a transition series, the Belt Terrane, containing undoubted through fragmentary fossils. The lowest rocks of the next series (Cambrian) form the lowest stratum of the Palaeozoic or Primary Era and here are found the first abundant traces of life. These traces are of the simpler kinds of organisms, the invertebrates, and are only found in sedimentary rocks that have been formed by the accumulated detritus derived from preexisting rocks. The duration of the Pre-Cambrian era must have been as long as all the succeeding epochs put together, and the total lapse of time since the beginning of the formation of the sedimentary or stratified rocks (including the Pre-Cambrian) would be at least 100,000,000 years.

Ascending the geological scale, we find fishes first appearing in the Ordovician strata, then successively Amphibians in the lower Carboniferous, reptiles in the upper Carboniferous, birds in the Jurassic, mammals in the Triassic, and man in the most recent or Pleistocene formation, which is about 4,000 feet thick.

If it is true that all existing species have descended by a process of modification from other species fewer in number and simpler in structure, then it is to be expected that some of the intermediate links could be found, notwithstanding the admitted imperfections of the known geological record. And such is the case. The cynodonts of the Permian and Triassic of South Africa link the reptiles and the mammals; Archaeopteryx of the Jurassic links the reptiles and birds; Deltatheridium of the Cretaceous links the placental mammals with the more primitive mammals. The fossil histories of cephalopods, horses, rhinoceroses, elephants and camels have been fairly well traced and numerous connecting forms discovered, the most complete being that of the horse, whose peculiar one-toed hoof readily lends itself to popular explanation. Our knowledge of this extremely interesting series, largely due to the late Prof. O. C. Marsh, has been ably summarized by Dr. W. D. Matthew. The horse family originated from the Condylarthra, a group of five-toed ungulate mammals, which appears at the base of the Tertiary. The evolution of the horse took place chiefly in America. A summary history of the fore foot is shown in the illustration from the American Museum of Natural History.

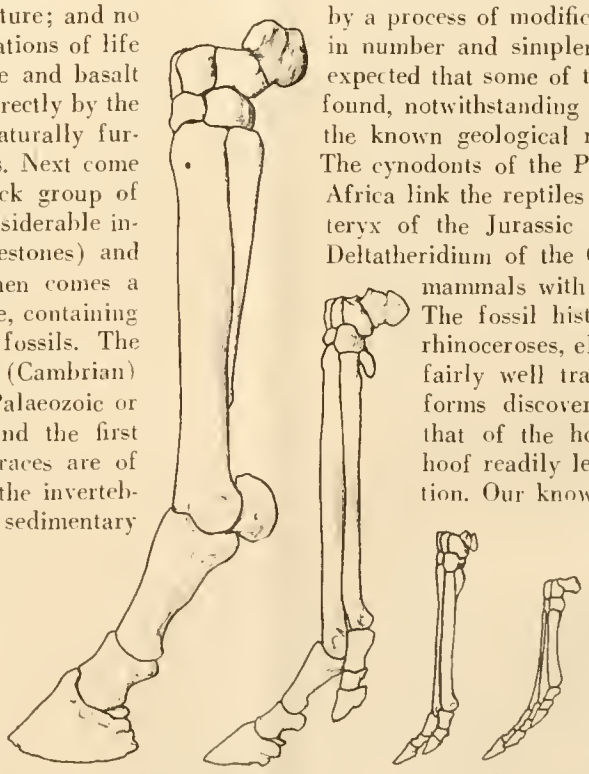


FIG. 2. EVOLUTION OF THE FORE FOOT PRINCIPAL STAGES

(Right to Left)
1. Four-toed horse *Eohippus*. Eocene Epoch
2. Early three-toed horse *Mesohippus*. Oligocene Epoch
3. Later three-toed horse *Merychippus*. Miocene Epoch
4. One-toed horse *Equus*. Pleistocene Epoch and Modern

All outside views showing the middle and outer digits of the fore foot. In *Eohippus* the two outer toes (digits IV and V) are complete. In *Mesohippus*, digit V is reduced to a small splint and digit IV is notably smaller than the middle digit In *Merychippus*, digit V is a tiny nodule of bone and digit IV has become very slender in comparison with the middle digit. In *Equus* digit IV is reduced to a long splint, while of the fifth digit no trace remains

(Continued in next issue)

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SCIENTIFIC "SNOBBERY"

We agree with much of the article by T. Swann Harding in this issue. The aversion of many scientific men to "popularizations" is a fact. This deprives the average man of a broad knowledge of truth, and leaves a fertile field for fundamentalism.

But it is not mere "snobbishness." The scientist must needs employ precise and specialized language in his everyday work. To write popularly he must translate. This is difficult. It takes time. And he always has more work than time.

Besides, popularizations tend to distort and sensationalize. The scientist revolts at distortions. He wants facts, unglossed and unperverted. He devotes his life to get things straight and he wants them put straight. We respect him for this. It is not snobbery. It is scientific care and honesty.

In spite of these difficulties, or rather because of them, we ask men of science to help produce this journal.

THERE'S A DIFFERENCE

A lawyer is specially trained to pick out of all the facts those that will best sustain his case.

A salesman is trained to select from all the facts those that will make the best talking points and to keep still about the others.

A minister is trained to ignore facts or harmonize them with what he considers revelation.

A politician is trained to discern what facts will have popular appeal.

A scientist is trained to consider ALL known facts, to search constantly for new facts and to hold opinion in his special field only on the basis of facts.

DEBATES—THE MORE THE BETTER

In his Official Organ the Reverend Riley crows mighty cockily over "winning" some debates against evolution. What difference does it make how the crowd votes? Has the reverend a single instance of "converting" an evolutionist?

On the other hand, we are sure that on every such occasion the seed of evolution is planted in some minds. The more opponents are at the debates the greater our opportunity.

We urge readers to arrange public debates with fundamentalists on every possible occasion. The more the fundamentalists "win" the more they lose. And we can afford to lose a thousand times. WE need only win *once*.

WRITERS, WE BEG OF YOU

Send us less speculative articles on philosophy and religion, the Origin and Destiny of the Cosmos, the Whyness of the Wherefore and the Thusness of the Because.

Let's have more interesting news, facts, discoveries of science regarding the processes of nature. Less argument. More description.

Columbia University
in the City of New York
DEPARTMENT OF PHILOSOPHY

APRIL 2 '28

My dear Sir,

Permit me to offer my congratulations on your periodical, Evolution. They apply both to the idea and its execution. The present state of the public mind and of discussion as well of projected legislation make it highly important that there should be issued statements regarding the various aspects of the evolutionary controversy which can be widely read and understood. You have been fortunate in enlisting as writers persons of unquestioned competency and having a clear style. I am impressed with the fact that the Journal is scientific as well as popular. You are rendering a public service and I wish you every success.

Sincerely yours,

John Dewey

THE UNIVERSAL TRUTH OF EVOLUTION

V. F. CALVERTON

WHILE the idea of evolution was first discussed by the Greeks, and Anaximander early argued that:

"Living creatures arose from the moist element as it was evaporated by the sun. Man was like another animal, viz: a fish in the beginning. . . .

"Man was born from animals of another species . . . while other animals quickly find food for themselves, man alone requires a lengthy period of suckling. Hence, had he been originally as he is now, he would never have survived . . .

"At first human beings arose in the inside of fishes, and after having been reared like sharks and become capable of protecting themselves, they were finally cast ashore and took to land," it is rather in the form of suggestion than verification that the theory was advanced. Aristotle, in his penetrating deductions, had subjected about five hundred and forty animals to examination. He had conceived of a graded order of life, in which evolution was inherent. In many other phases of Greek thought an evolutionary attitude is to be detected.

What we wish to stress in this article, however, is that the theory of evolution, although first proposed by the Greeks, does not become a scientific hypothesis until certain material changes take place in man's life. All during the Middle Ages the theory of evolution was undeveloped. The static form of life and the ecclesiastical influence upon letters discouraged the evolutionary approach. It is only with the rise of commerce at the close of the Middle Ages that modern science actually began. It is no capricious coincidence that Kepler, Copernicus and Galileo fall within the loose embrace of this new period. These changes in physical science were closely connected with changes in economic life.

The Industrial Revolution was, however, the cause of far greater transformations in Western life. We may say without exaggeration that the outstanding characteristic of Western Europe during the nineteenth century was "*change*." The Industrial Revolution was the dynamo that electrified the age with new desires and fresh vision. Life became agog with activity and creation. Newness almost lost its novelty. New aspirations multiplied with every dawn. Invention succeeded invention until the genius of the age became a miracle in mechanics. Men became interested in the mastery of existence. The machine promised a new world at human command. Once an adventure into the strange and mysterious, science now became an open sesame to the control of the universe. The idea of movement and change became an obsession. Evolution became an active doctrine that invaded every avenue of thought.

The ancient aeons of the earth's past disclosed themselves in geological forma-

tions and structures. The rapid mutations of the modern world revealed themselves in social science and historical theory.

At this time modern geology was born and the earth was seen in an entirely new light. The rocks embedded beneath its surface disclosed the changes that had occured in its history and the presence of fossils identified these epochs. A certain ecclesiastic of note maintained that these fossils had been inserted into the soil by God in order to test men's faith. Nevertheless, geology progressed and through its evolutionary hypothesis became an important science for man.

Into the study of society and the family the idea of evolution was introduced. In political science and economics the evolutionary attitude became paramount. The same evolutionary approach is marked in the study of literature and art. In this same era arose an evolutionary conception of religion. And in psychology the whole modern outlook is a dynamic evolutionary one.

The theory of evolution advanced by Darwin is therefore only part of a vast movement which shook every field of thought with its vibrations. To oppose it is to oppose the entire advance of human intelligence in every avenue of thought. The evolution of man from more primitive forms of life is bound up closely with the idea of evolution in every other field of study. Only ignorance can today deny its truth.

BREAD AND BUTTER VALUE OF EVOLUTION

In a recent address at the New York Botanic Gardens the renowned botanist, Dr. John M. Coulter, pointed out the "bread and butter" value of a knowledge of evolution to the human race. In the last ten years the increase in the possibilities of food production has begun to outstrip the increase in population, thanks to a study of plant crops in the light of evolutionary knowledge. So perhaps Malthus was barking up the wrong tree.

EVOLUTION DINNERS

At the time of going to press we had word that EVOLUTION dinners were being arranged in Denver, Chicago, Detroit, Los Angeles and Rochester, to take place at the same hour as the EVOLUTION dinner at Cafe Boulevard, New York, 6:45 Friday evening, April 13, to celebrate our first anniversary.

Undoubtedly readers of EVOLUTION will also gather in many other cities on that evening. A complete report will appear in our next issue.

At the New York EVOLUTION dinner Charles Francis Potter will be toastmaster and Alexander Goldenweiser will open the symposium on "The Evolution of EVOLUTION." Among the other speakers will be: Leonard D. Abbott, Allan S. Broms, George Dorsey, Harry Hibschman. Joseph Lewis and Henshaw Ward. There will be music by Laura Newell-Veissi, Harpist, and Lorene Davis, Trumpet and Mellophone Soloist.

THE VERDICT OF COLLEGE PRESIDENTS

TO ascertain the attitude of the college world toward the issues raised by the fundamentalists we recently sent a "Confidential Questionnaire" to every college and university president listed in the New York World Almanac. Eighty-three out of 560 answered. No replies came from the larger universities, which would, of course, be unanimous for evolution. But the answers from medium-sized institutions came from all over the country, and can be accepted as fairly representative of the college world.

(Considering only the "yes" and "no" votes, the proportions would be as shown in the diagram.)

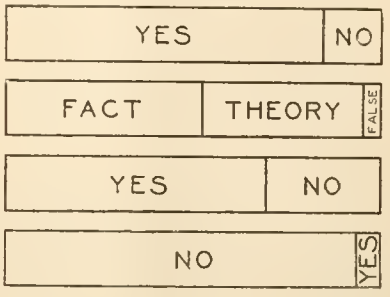
The questions and answers were:

1. "Is evolution taught in your institution?" Yes, 64; no, 11; noncommittal, 8.

2. "Is it taught as fact or as mere theory?" Fact, 41; theory, 27; false, 5; noncommittal, 10.

3. "Do YOU consider evolution a fact?" Yes, 40; no, 25; noncommittal, 18.

4. "Should teaching evolution be prohibited by law?" Yes, 5; no, 66; noncommittal, 12.



If these eighty-three colleges are divided into four sections, it is found that there is nothing sectional in their attitude toward these questions. The sixty-four colleges teaching evolution as a fact include: East, 16 out of 22; Central, 20 out of 24; West, 15 out of 19; South, 13 out of 18. On the other hand, each section has one of the college presidents that want the teaching of evolution prohibited by law except the East, which has two, both in New York State. Needless to say that these are all presidents of rather insignificant denominational colleges.

Since we agreed in this questionnaire to keep the answers confidential unless comment was written on a separate sheet, we cannot indicate the identity of the colleges participating, but our readers may rest assured that the full details would give the fundamentalists small comfort.

A few of the Honorable Presidents made delightful contortions in their efforts to avoid direct answer to the question, "Do YOU consider evolution a fact?" One counters with: "Any scientific theory is subject to revision, i. e., gravitation and relativity." A most profound observation. Another sidesteps rather awkwardly: "Our professor of biology does. I am not a scientist." And another shows his inexperience at pussyfooting by: "It depends on what you mean by evolution." He needs to take lessons from the more expert colleague, who observes very learnedly: "In my judgment, a very valuable and interesting hypothesis, worthy of careful and candid consideration with an open and inquiring mind."

And then we have a sidestepper par excellence, who comes back at us with: "You as a scientist must know, as I do, that evolution is a method and a process and not a fact." And a truly fancy pussyfooter who squelches us: "Your question indicates immaturity of thought."

One who does not hide his light under a bushel, but lets us have his comment for publication, is C. E. Erickson of Upsala College. Under the heading, "Evolution, Fact or Theory?" he writes:

"It is a rather uncritical way of stating the question. Is there a sharp line of division between fact and theory? I believe that evolution *leans* more toward the theory side than toward the fact side. What *brand* of evolution would you call a fact? Lamarckian, Darwinian, Bergsonian, Mutation? Or can we believe in evolution in general as a fact without agreeing on the details? Can we believe in *what* without knowing *how?* This we can do only when our knowledge is made up of facts of sense experience. But evolution is mainly a *logical construction*, and if the logic fails, what becomes of the theory? There is at least as much loose thinking on evolution today as there ever was in theology."

How true, professor, how true. This last about "loose thinking" we mean.

But you'll agree that there's nothing loose about the following, which comes straight from the manly shoulder of President Frazer of Queen's College:

"The institution at Queen's College has no interest whatever in your propaganda concerning evolution. We have a corps of enlightened teachers and run our institution according to our conception of truth, and do not wish to have anything whatever to do with such propaganda as you are interested in."

And there's a real wallop from J. Oliver Buswell, Jr., whose letter head proclaims "Let There Be Light and There Was Light." He tells us what's what as follows: "We have a thoroughly equipped and well organized group of scientific laboratories in Wheaton College, but we have no sympathy whatsoever with an atheistic propaganda which masks itself with the popular scientific terms of our day."

Thus the college presidents. In spite of these comments, according to the result of this questionnaire, the overwhelming majority recognize evolution as a fact and teach it as such in their institutions, and they are almost unanimously opposed to the fundamentalist efforts to prohibit the teaching of evolution by law.

The Beebe Collection

J. O. Beebe

Two of the most enthusiastic supporters of Evolution are Mr. and Mrs. J. O. Beebe of Los Angeles. Although they have been very ill this winter (he is 82 and she is 75) their names have appeared several times in our Evolution Honor Roll.

Perhaps this is but natural, since theirs is a life time interest in the subject. They have in their home one of the most complete collections of fossil crinoids, starfishes, sea urchins, trilobites, corals, insects, etc., to be found anywhere in the world. Their collection of over one hundred thousand specimens constitutes a most convincing demonstration of the Fact of evolution.

The collection of fossil crinoids (so-called stone-lilies) is particularly interesting. Crinoids are animals low in the scale of life. They have existed in the oceans through the ages for at least forty million years. They grow on roots like vegetables and are reared on stems, their bodies and arms resembling flowers or tiny bushes. Yet each has a stomach, internal organs and a nervous system. They bristle all over with proofs of evolution, plainly visible from age to age.

Mrs. J. O. Beebe

One of the strangest specimens is the Antedon Crinoid, which still lives in the ocean. This has the power of breaking itself away from the stem, turning mouth downwards and growing into the "Comatula", which starfish experts want to call a starfish.

The illustration, showing only one of the large number of cases housing the Beebe collection, gives but a faint idea of the treat in store for those who have opportunity to examine it. It bears witness to a lifetime endeavor on the part of Mr. and Mrs. J. O. Beebe, who may well be proud of having compiled this concrete proof of evolution, and it gives us great pleasure, to introduce two such servants of science as an inspiring example to our readers.

Ancestral Man. Primitive horse. Primitive fishes and starfishes. Sea animals, among them the long stems of stone-lilies or crinoids (really animals).

DID LIFE BEGIN?

(From Herald-Tribune, June 10, 1927)

IN the perennial discussion of where, when or how life may have begun on earth, it seems never to occur to the disputants to make the first and most obvious of inquiries, the inquiry whether life began at all. Strict logicians would insist that the very idea of beginning is a human artifact; there is no proof of it in nature. The debate which has raged around so many country store cracker barrels as to which came first, the chicken or the egg, conceals a real uncertainty. Even without venturing into the most rarefied altitudes of philosophic thought, it is obvious that the idea of a beginning slips easily through the fingers of the mind. Every one admits that an acorn may become an oak. At what exact instant does it cease to be an acorn and begin to be a tree?

Uncertainty about just what constitutes beginning is strictly applicable to the supposed beginning of life. There has been life on earth, geologists believe, for at least a billion years. The earth itself is far older. Sometime during the unknown prehistory of a few billion years non-living matter altered somehow into living matter. There is no biological reason to imagine that the change was sudden. Even if science possessed a perfect record of the missing millenia it would be as impossible to put a mental finger on a certain moment and say, "Here is when life began," as it is to select the definite second when an acorn begins to be a tree. Critics will urge that the acorn always possesses the potentiality of being a tree, which is quite true. And how does any one know that this is less true of matter and of life?

In the adolescence of the earth, newly cooled from the ball of flaming gas which the sun is believed to have cast off, natural conditions were not those of today. For one thing, there was probably no trace of free oxygen in the air. The chemicals dissolved in the ocean were different from those of to-day. Very slowly these dissolved chemicals came to be alive. Some celestial chemist, dipping an exploratory finger into that ancient manufactory of life at intervals of a thousand years, would have perceived no change. Only at time intervals to be measured in millions or billions of years would life be perceived some day to have crept in unnoticed. Parents, seeing their children daily, observe no change. It needs the distant uncle, arriving for his first visit after a decade, to notice that a new man or woman has begun.

WANTED:—

Every reader to be a reporter for the Funnymentals column. Send exact quotations from fundamentalist speeches and writings, suitable for publication in Funnymentals column, being *sure* to give *authority.*

The Snobbery of Science

T. Swann Harding

"It must be admitted that science has its castes," writes G. N. Lewis in "The Anatomy of Science" and he later speaks of "the snobbery of science". In the words of our modern vulgate, Lewis didn't know the half of it!

There are well meaning people who want science made available to the masses, who think that the clarity and precision that could be imparted to mass thought by a widespread acquaintance with scientific method would be invaluable socially, politically, economically and in mere personal relations. These good people simply do not realize the almost insuperable difficulties in the way of acquainting the masses with science.

Scientific popularization by the non-scientist untrained to think precisely, unused to examine evidence, to evaluate facts and form sound, impartial judgments, who has never undergone the vigorous scientific training, simply cannot write competently upon science. He finds it hard system supplant verification and reality.

What can he do? He can write a good story, speaking journalistically. By unfounded inference and unwarranted liberties he can produce an article which will hold the attention of the average reader and will for that reason merit favorable editorial consideration. The average editor does not ask whether such an article is accurate. He asks whether it will hold the attention of his readers.

He also says, "If this stuff is over my head it is probably over the heads of my readers." This is probably untrue. For readers are really more ready for dignified scientific enlightenment than editors are to give them such enlightenment. Nor is there any valid reason why an editor should fear to embark upon a moderate educational program from time to time. He could still make money and at the same time be leading his readers to a better appreciation of scientific endeavor.

But this editorial obstacle is only one thing which obstructs popular enlightenment in science, and this is very far from a castigation of editors. The scientist himself shares the blame for separating science from the public. In fact, the attitude of the editors becomes more comprehensible when we consider the snobbery of science. Let us give an example.

The Russian Government produced a cinema film of the physiologist Pavlov's work on secretions, reflexes and the localization of various brain centers controlling muscular, auditory, visual and others acts. An audience of average intelligence, scientifically untrained in complex research so remote from ordinary life, could view this film and in one hour and a quarter gain a useful comprehension of twenty-eight years work by this famous physiologist and his co-workers.

The film was a masterpiece in lay education. The audience learned more in less space of time than they had ever learned on that subject in their lives before. It told more of evolution than could be conveyed to these people by volumes, which they probably would not read anyway. Here was no propaganda, no fevered effort to convince—but mere, unvarnished facts speaking visibly for themselves—the greatest educational force in the world. A little fundamentalist flapper from Richmond, Virginia, who had never heard of biology in her life save to be warned against it, was suddenly convinced of evolution and her entire anti-scientific training was undermined fatally within the hour. Let such films multiply and we should soon have fundamentalists clamoring to give alms to research laboratories instead of clamoring for anti-evolution laws.

Then how did scientists, on the average, view the effect of this film upon laymen? Hrdlicka and other great scientists thought the show worth seeing. But as an example of snobbishness, a certain pair of young research workers who saw this film typify the attitude of many scientists. They absolutely deplored it. Such an attitude might be expected from older men, but these were representative young workers in science, products of the very finest British and American universities. They deplored the film as an example of pernicous popularization which should never be indulged. Intelligent laymen should be aware of this snobbish scientific attitude which is quite in line with a fashionable attitude in scientific circles today.

To be sure they differed in a minor degree. One thought that science should be reserved altogether for the amusement and delectation of scientists alone, and kept entirely free from the proletariat. He was obviously a high churchman. The other was a broad churchman. He thought that the masses might seek to learn of science and to find something for themselves if they always did so by individual initiative, but that no efforts should be made to interest the masses in science because that would mean a sacrifice of dignity. In either case, such an attitude bodes ill for science.

The heretical investigator who seeks to convey what he or others have done in clear and concise language is derided, deplored and declasse. That explains why the editor is really troubled with the rejection of so little effective scientific writing, for only the scientific writer can competently do that writing and so few dare do so. Yet people are so determined to adhere to the worshipful attitude towards holy, sacred scientific research that few care to acquaint readers with an aristocratic snobbery on the part of pure scientists which does more to retard the dissemination of the scientific viewpoint, and therefore the progress of civilization, than any other single factor. This snobbery should be scotched before it does science serious damage.

SHARES AVAILABLE

The Evolution Publishing Corporation, organized under New York State laws, offers its $10.00 shares of 6% preferred stock. With every five shares of preferred one $10.00 share of common, voting stock will be given.

The immediate business is publishing this journal, Evolution and selling books. Later a Lyceum Bureau for touring natural science lecturers will be developed.

Although it is expected the business will pay, share-holders are not invited on the basis of making profits, but because this work is WORTH DOING.

Additional capital furnished now will help make the circulation campaign for Evolution magazine a success. Checks should be made payable to Evolution Publishing Corporation. In remitting kindly state whether payment is made in full, or whether it should be applied on a larger block of stock to be held until balance is paid.

LET US MAIL SAMPLES TO YOUR FRIENDS

Of course you'll show this issue of Evolution to your friends and ask them to subscribe. But you probably know some who would be interested, whom you can not visit yourself. Send us their names and addresses and we'll mail them sample copies.

It will cost us about five cents a copy to send out these samples, so if you can send along a check to help pay for them we'll not object. However, if your bank account is minus don't let that stop you. Send us the names anyway and we'll raise the cash otherwise.

WHAT'S A HUNTER WITHOUT AMMUNITION?

A hunter without ammunition is in the same fix as an evolutionist without copies of Evolution. Surely YOU don't want to remain in such a pickle. The best way out is for you to fill in appropriate characters on the following blank in a hurry.

— — — — — — — — —

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Funnymentals

"Believers in Evolution are one third beast, one third devil and one third University Professor." Evangelist Dixon of Chicago, in Straton's Church.

"I thank God that we have no free schools nor printing presses, and I hope that we shall not have any for a hundred years; for learning has brought disobedience and heresy and sects into the world, and printing has divulged them and libelled governments. God keep us from both." Gov. Berkley of Virginia, quoted by Robert Baird, The Christian Retrospect and Register, 1851.

"Bring a man to believe that the decalogue is not divinely inspired and that human government has no better basis than a particular stage in an evolutionary process, and he will inevitably trample the decalogue under feet, disregard your State statutes, and end in prison." Christian Fundamentalist, April, 1928.

"The opinion of the earth's motion is of all heresies the most abominable, the most pernicious, the most scandalous; the immovability of the earth is thrice sacred. Arguments against the immortality of the soul, the existence of God and the Incarnation should be tolerated sooner than an argument to prove that the earth moves." Jesuit Father Melchior Inchofer, 1631.

"This magazine (EVOLUTION) which sets up to fight fundamentalism is really fighting dialectic materialism and a scientific approach to the universe much harder. It takes its stand against fundamentalism, but also against scientific materialism and for theism, fideism, spiritualism and every kind of 'modern' and 'enlightened' ideological reaction, with even fundamentalism having an opportunity to sneak in again by the back door."—Bertram D. Wolfe, New York.

"The ark was approximately 450 feet long, 75 feet wide, and had three floors. Very little food was necessary, enough simply for the maintenance of life. Many of the smaller animals and birds could occupy cells with the larger animals.—It is well to suppose that the "twos" in the ark were not systematic species, but natural species, capable of varying in descent after the flood in the same manner as the human species has done. It is, therefore, unjust to the Sacred Record to insist that the ark carried two of every variety, e. g., two fox terriers, two coyotes, two wolves, two jackals, two collies, etc., for that would be to crowd the ark unnecessarily in our understanding. It is better to say that the ark carried two animals we might call "dogs" from which after the flood all the above-mentioned varieties have come. The load of the ark, then, is considerably lightened.—Very likely, then, the ark contained two of each of these natural species, out of which, since the flood, the world has been replenished. Noah had one hundred and twenty years in which to make the proper selection, and doubtless God supplied him with the proper guidance." Byron C. Nelson in The Bible Champion, April, 1928.

"The Bible does not say that reproduction shall be *nearly* according to kind or *seemingly* according to kind. The statement is positive that it is *according to kind*, and that does not leave any room for the *changes*, however gradual or imperceptible that are necessary to support the evolutionary hypothesis."—William Jennings Bryan in "The Menace of Darwinism."

"Joshua would not have commanded the sun to stand still if it hadn't been a movin'." Rev. John Jasper, Richmond, Va.

BOB TAYLOR'S GEOGRAPHY STORY

By A. DUY MCNAIR

THE late Governor Bob Taylor of Tennessee was a famous story teller. One of the many stories with which he convulsed his audiences was that of the young man who applied for a job of teaching a country school. He was asked by the school trustee whether he taught geography by the round earth system or the flat earth system, to which question he replied diplomatically that he could teach it either way.

In certain quarters teachers of biology are asked whether they teach it by the special creation theory or the evolution theory. The public does not laugh at this as they did at the other, yet the principle is the same. They will laugh at it some day but that time has not yet come. It is assumed in the case of geography that the teacher knows his subject and should teach it accordingly, but it is assumed in the case of biology that the teacher does not know his subject and must be told what to teach or, at least, what not to teach.

The round earth theory of geography and the evolution theory stand on substantially the same footing as regards the Bible. Before the rotundity of the earth was generally accepted, the Bible was quoted to show that the earth is flat. The "waters above the firmament" and "the foundation of the earth upon the waters", the "corners of the earth", seem to imply it.

It was, of course, futile to quote these things against the idea of a round earth though the quotations were convincing to many people until Magellan's ship actually went around the earth. It is also futile to quote the Bible against the doctrine of evolution. Under the pressure of school boards and public sentiment certain teachers of biology here and there are willing to teach it "either way" but in the long run the matter will be decided by the evidence in nature.

THE HE-MAN

My father many times removed
And many times removed from that,
Went wandering through the verdant wood,
He wore no shoes nor any hat.

His wife, an equal suffragette.
He wooed and won right daintily.
He cracked her skull with his war club
And dragged her off to slavery.

So when I'm told that I am bad
And ornery and awful rough
I always think of my old dad
And say, "I'm not half rough enough."

G. T., in Good Morning.

FUNDAMENTALIST CONVENTION

The World's Christian Fundamentals Association will holds its tenth anniversary convention in Chicago May 13 to 20. Our next issue will contain special articles dealing with this occasion. Every reader around Chicago should supply himself with a bundle to circulate among his friends to counteract the fundamentalist campaign.

SO THAT'S HOW IT WAS

Overheard at the Los Angeles Museum School Children's Day

"Teacher, Who killed the Mastodon
That grew these monstrous bones?"
"He was crowded out of the Ark, my child
So he went to Davy Jones.

"The Big Ones couldn't get into the Ark—
They were too long and wide;
There wasn't a place on earth to park,
So they all got wet—and died;

"If God had ordered a larger craft—
With plenty of grain and hay,
And acres of deck-room fore and aft,
They would be alive today.

"But the Ark was full; it was 'S. R. O.'
With Jehovah's pets aboard—
When Father Noah slammed the door
And Jupiter Pluvius 'poured'."

J. C. DAVIS.

ANTI-EVOLUTION BOOKS

MANY of our readers are not aware of the existence of a rapidly growing anti-evolution literature in this country. We therefore propose to review at least one book opposing evolution in every issue.

This month we intended to review "Evolution Disproved," but a review of this book made in the Buffalo Evening News of March 17 by Albert R. Shadle is so well done that we reprint it here.

EVOLUTION DISPROVED. Published by the author, *W. A. Williams, D.D.*, Camden, N. J. Revised edition, 1928. $1.00.

By ALBERT R. SHADLE

Head Biology Department, University of Buffalo.

In the introduction the author says: "Let it be understood at the outset that every proved theory of science is to be accepted." He then decries "prejudice" and narrow-mindedness and assures the reader that evolution will be examined "upon its merits and from a scientific standpoint."

His thesis is, "Mathematics the acid test," "figures will not lie"; however, it is quite evident a little later that they are manipulated in such a manner as to appear to prove whatever the author wishes to bring out. The place of the origin of man is an unsettled point scientifically, and probably will be for some time, yet the author takes for granted that the Biblical account is the only one to be considered. He then figures out the size of the Garden of Eden to have been 12,500 square miles, i. e., 100 miles wide and 125 miles long. Having these figures for the size of Eden, he figures out that Moses had one chance in 4,000 and five in making a correct guess on the place of origin of man, and the author says that Moses did guess correctly. There is no basis for these figures except that he wishes to be liberal in laying out the Garden of Eden. This is a fair sample of the manner in which figures are manipulated.

The same old trick of taking a quotation from some author and treating it in such a way as to change the whole meaning is often used. Bateson is again quoted in such a way that the reader is left with the opinion that he did not believe in evolution. Bateson did not question the fact of evolution, but was trying to reach an evaluation of the methods by which the results were accomplished.

Great emphasis is laid upon the question of the origin of new species and upon the fact that biologists do not all agree as to exactly what constitutes a species. The author then in speaking of "Geology and History" says: "Even if the missing links in the development of the horse could be found, it would still be the same all the while." This brings out the fact that he is not familiar with even the current notions of what a species is and besides that his biological information is full of errors and misstatements. There are several species of horses living today, viz, the common horse, the Asiatic wild horse, the zebras, of which there are a number of species; also different species of asses. Within the past fifty years the quaggo and one or two other species of horse have become extinct through the slaughter perpetrated by white men, either directly or indirectly. Besides these several living species, there are many others that are known only from their fossil remains, of which there is a remarkably fine series connecting four-toed ancestors, which were about the size of a dog or a fox.

In another place he says: "No transitional forms have been found between reptiles and mammals, and we have seen that there are no reliable forms between man and mammals." Thus he ignores the fact that the lowest group of mammals, the monotremes, show marked reptilian characteristics, and dismiss all palaeontological evidence of prehistoric man and of the relationship between extinct reptiles and mammals. This hardly seems in accord with the original statement of "open-mindedness and scientific treatment" of the subject, and, moreover, the statements made are not based upon facts. This sort of thing is often encountered and is due to lack of familiarity with the biological subjects which he discusses.

The author uses quotations from many sources, some of which are well taken, but many are absurd and even ridiculous. One quotation (page 46) from "In His Image" purports to be the evolutionist's idea of the origin and development of the legs of animals. The whole quotation is so fallacious that the reader marvels that educated men would resort to propaganda composed of such ignorance and willful delusions.

In regard to the fossil remains of man the author says: "As fossils must be imbedded in rock, there is not a single fossil of an ape-man in the world." This is the manner in which he tries to dispose of prehistoric human fossil remains. Judged by his own statement, he is not familiar with the general nature of fossils nor even the meaning of the term as given in the dictionary.

In spite of this very serious lack of information, he offers what are supposed to be the authoritative opinions on these matters.

In summing up the book one could say that to the biased anti-evolutionist it will be a great boon, for he will find what he wishes to read. To the evolutionist who knows the facts about evolution the book will be of interest in showing how these facts can be distorted and misstated. At times he will find it so ridiculous that it may be amusing. The reader who is looking for reliable information and an impartial presentation of the facts of the case will be very much disappointed. In places the discussion deteriorates into the rabid, ranting type of which we heard so much at the time of the Scopes trial.

SOME GOOD BOOKS

EVERY reader of EVOLUTION is *of course* also a reader of books. We recommend the following in their respective fields.

We shall also be glad to supply any other books at regular publishers price.

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"Your editorial, 'Pussyfooting,' does not bear out the facts. It was decided that it would be better policy to avoid emphasizing the word 'evolution' and allied comment at the Nashville meeting. The fight is not so much on the doctrine or subject, fact or hypothesis of evolution as it is a fight for academic freedom. There was no reason, in the opinions of our best informed academicians, "to revive the subject." There were other matters of vast importance scheduled to take up the time of the gentlemen and gentlewomen who attended the Nashville meeting. With all due respect I believe the magazine improperly edited."—F. von Falkenberg, Florida.

"Congratulations on the splendid numbers which you have issued."—E. M. Kindle, Geological Survey, Canada.

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EVOLUTION AND MORALS

By W. C. MACPHERSON

A fundamentalist quoted in your February number affirms that 'monkey men make monkey morals', amplifying this alliterative gem with other similar statements. This argument will doubtless be met often and will be offered with some apparent justification by those who believe that morality—decent conduct—is the result of standard conviction concerning punishment and reward.

Morality based upon hope or fear of consequences is a pretense,—a counterfeit,—to "get by" with the public. Those who honestly care to be decent for the sake of decency; to be respectable on principle; to be moral for humanitarian reasons will have their eyes wide open to nature's facts and much more consistently than those who cling to delusions and formulate their standards of conduct from motives of policy.

Even if the reverse were true it would in no way alter the facts of evolution. Darwin's deductions are made no more substantial, and no less so, by any opinion or observation as to what may or may not follow as a consequence of *believing* them.

Proper standards of conduct are obviously not guaranteed by religious persuasions. No more will they be endangered by a clearer general knowledge of facts underlying the world's phenomena.

Those who maintain that it were not wise to entrust the public with a knowledge of facts, acknowledge by that argument, that they are deliberately advocating what they know to be false.

PITY THE HEATHEN

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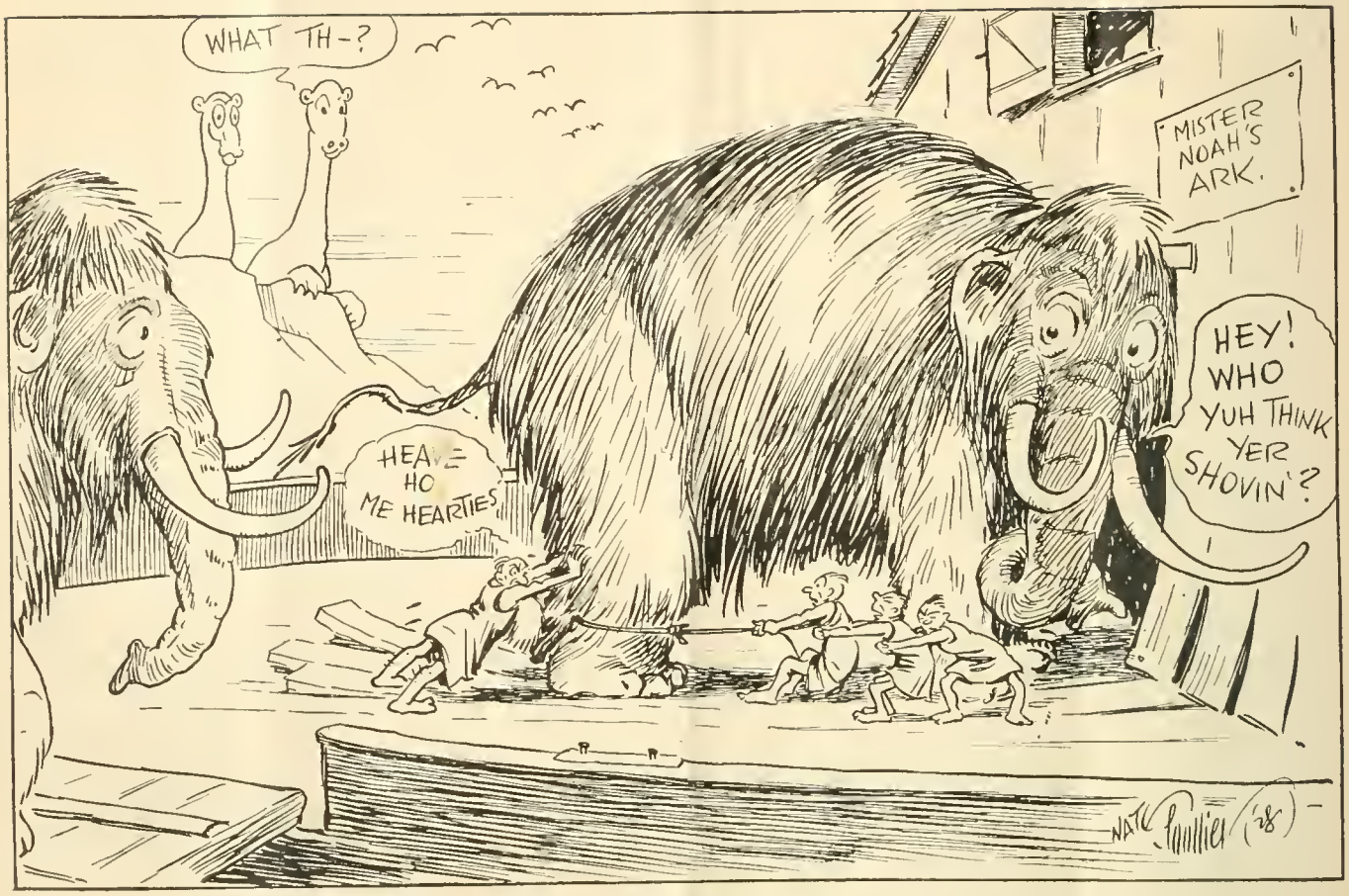

"The Dinosaur and Mastodon became extinct not because of evolutionary changes, but because they were too big to be got into Noah's Ark."
Founder and President of World's Christian Fundamentals Association, in debate in Los Angeles.

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and defeat this insidious propaganda of organized bigotry is to let the light of science shine upon the dark corners of their game.

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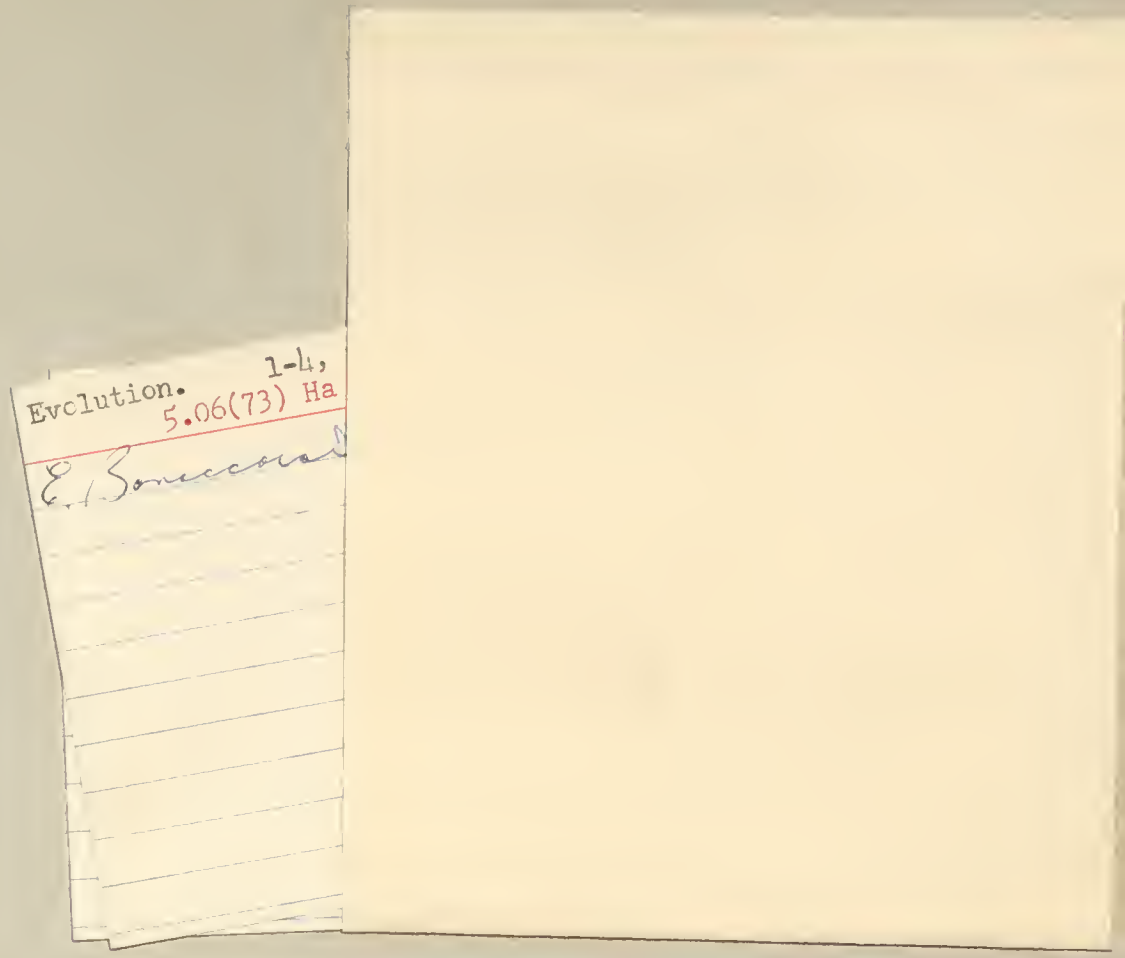

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